

AF/2814 JFW



Attorney Docket No. 5308-311

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Gerald H. Negley et al.

Confirmation No.: 4336

Application Serial No.: 10/659,108

Group Art Unit: 2814

Filed: September 9, 2003

Examiner: Thao X. Le

For: SOLID METAL BLOCK MOUNTING SUBSTRATES FOR SEMICONDUCTOR
LIGHT EMITTING DEVICES

January 9, 2006

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CONFIRMATION SUBMISSION OF APPEAL BRIEF

Sir:

Attached is a confirmation copy of an Appeal Brief that was filed for the above-identified application via facsimile on January 9, 2006. Appellants are filing this confirmation copy in order for the Board of Appeals and Interferences to see the notation on reproduced Figure 1 of Shie et al. as shown on Page 6 of the Appeal Brief.

It is believed that no additional fee is due, other than the fees already paid with the facsimile submission of the Appeal Brief. However, any additional fees believed to be due in connection with this paper may be charged to our Deposit Account No. 50-0220

Respectfully submitted,

Mitchell S. Bigel
Registration No. 29,614

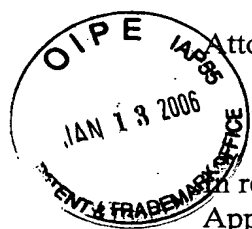
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Susan E. Freedman

Date of Signature: January 9, 2006



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Susan E. Freedman

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APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. §41.37

Sir:

This Appeal Brief is filed pursuant to the "Notice of Appeal to the Board of Patent Appeals and Interferences" mailed October 20, 2005.

Real Party In Interest

The real party in interest is assignee Cree, Inc.

Related Appeals and Interferences

Appellants are aware of no appeals or interferences that would be affected by the present appeal.

Status of Claims

Appellants appeal the final rejection of Claims 3-7 and 9-20, which as of the filing date of this Brief, remain under consideration. The attached Appendix A presents the claims at issue as finally rejected in the Final Office Action of September 23, 2005 (hereinafter "Final Office Action").

Status of Amendments

The attached Appendix A presents the pending claims and each of the pending claims' corresponding status. All amendments in the present case have been entered.

Summary of the Claimed Subject Matter

The present application includes rejected independent Claims 3 and 15. Independent Claim 3 is directed to a mounting substrate for a semiconductor light emitting device and independent Claim 15 is directed to a light emitting device that includes a substrate. Reference is made to Figure 1H of the specification, reproduced below, as an example embodiment of these claims.

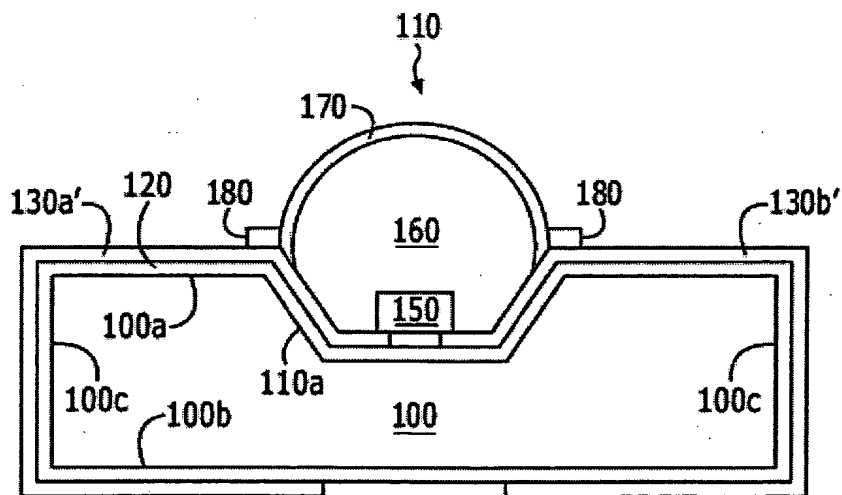


FIG. 1H

In particular, Claim 3 recites that the mounting substrate includes a solid aluminum block **100** including a cavity **110** in a face **100a** thereof, that is configured for mounting a semiconductor light emitting device **150** therein. A conformal insulating coating **120** comprising aluminum oxide is provided on a surface of the solid aluminum block and in the cavity **110**. Finally, first and second spaced apart conductive traces **130a'**, **130b'** are provided on the conformal insulating coating **120** in the cavity **110** and are configured for connection to the semiconductor light emitting device **150**, as shown in Figure 1H. Figure 1H is described in the specification, for example at Page 7, lines 1-10.

Independent Claim 15 recites a solid aluminum block **100** including a cavity **110** in a face **100a** thereof, and a conformal aluminum oxide coating **120** on a surface thereof including in the cavity **110**. First and second spaced apart conductive traces **130a'**, **130b'** are provided on the conformal aluminum coating in the cavity **110**. A semiconductor light emitting device **150** is mounted in the cavity **110** and is connected to the first and second spaced apart conductive traces **130a'**, **130b'**. A lens **170** extends across the cavity. An encapsulant **160** is provided between the semiconductor light emitting device **150** and the lens **170**.

Dependent Claims 4 and 16 recite that the first and second spaced apart conductive traces **130a'**, **130b'** extend around at least one side **100c** of the aluminum block **100** and onto a second face **100b** of the aluminum block **100**, as shown in Figure 1H. Dependent Claims 5 and 17 recite that the conductive traces **130a'**, **130b'** comprise reflective material, as described in the specification at Page 5, lines 31-33. Finally, dependent Claims 7 and 19 recite that through holes extend from the cavity to the second face as illustrated, for example, in Figure 1F, and described in the accompanying description.

Grounds of Rejection To Be Reviewed on Appeal

All of the pending Claims 3-7 and 9-20 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent 6,480,389 to Shie et al. in view of U.S. Publication 2004/0041757 to Yang et al.

Argument

I. Claims 3-7 and 9-20 Are Patentable Over Shie et al. In View of Yang et al.

As noted above, pending Claims 3-7 and 9-20 stand rejected under 35 USC §103(a) as being unpatentable over Shie et al. in view of Yang et al.

A. Introduction to 35 USC §103 Analysis

A determination under §103 that an invention would have been obvious to someone of ordinary skill in the art is a conclusion of law based on fact. *Panduit Corp. v. Dennison Mfg. Co.* 810 F.2d 1593, 1 U.S.P.Q.2d 1593 (Fed. Cir. 1987), *cert. denied*, 107 S.Ct. 2187. After the involved facts are determined, the decision maker must then make the legal determination of whether the claimed invention as a whole would have been obvious to a person having ordinary skill in the art at the time the invention was unknown, and just before it was made. *Id.* at 1596. The United States Patent and Trademark Office (USPTO) has the initial burden under §103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

To establish a *prima facie* case of obviousness, the prior art reference or references when combined must teach or suggest *all* the recitations of the claims, and there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. M.P.E.P. §2143. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. M.P.E.P. §2143.01, citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). As emphasized by the Court of Appeals for the Federal Circuit, to support combining references, evidence of a suggestion, teaching, or motivation to combine must be **clear and particular**, and this requirement for clear and particular evidence is not met by broad and conclusory statements about the teachings of references. *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). In another decision, the Court of Appeals for the Federal Circuit has stated that, to support combining or modifying references, there must be **particular** evidence from the prior art as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed. *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000).

B. Independent Claims 3 and 15 Are Patentable Over Shie et al. In View of Yang et al.

Independent Claim 3 recites:

3. A mounting substrate for a semiconductor light emitting device comprising:
a solid aluminum block including a cavity in a face thereof that is configured for mounting a semiconductor light emitting device therein; and
a conformal insulating coating comprising aluminum oxide on a surface of the solid aluminum block, and in the cavity; and
first and second spaced apart conductive traces on the conformal insulating coating in the cavity that are configured for connection to a semiconductor light emitting device. (Emphasis added.)

Moreover, remaining independent Claim 15 recites:

15. A light emitting device comprising:
a solid aluminum block including a cavity in a face thereof and a conformal aluminum oxide coating on a surface thereof including in the cavity;
first and second spaced apart conductive traces on the conformal aluminum oxide coating in the cavity;
a semiconductor light emitting device that is mounted in the cavity and is connected to the first and second spaced apart conductive traces;
a lens that extends across the cavity; and
an encapsulant between the semiconductor light emitting device and the lens. (Emphasis added.)

Accordingly, both independent Claims 3 and 15 clearly recite that the conformal aluminum oxide coating is in the cavity and that the first and second spaced apart conductive traces are on the conformal aluminum oxide coating in the cavity.

Shie et al. Figure 1 is reproduced below:

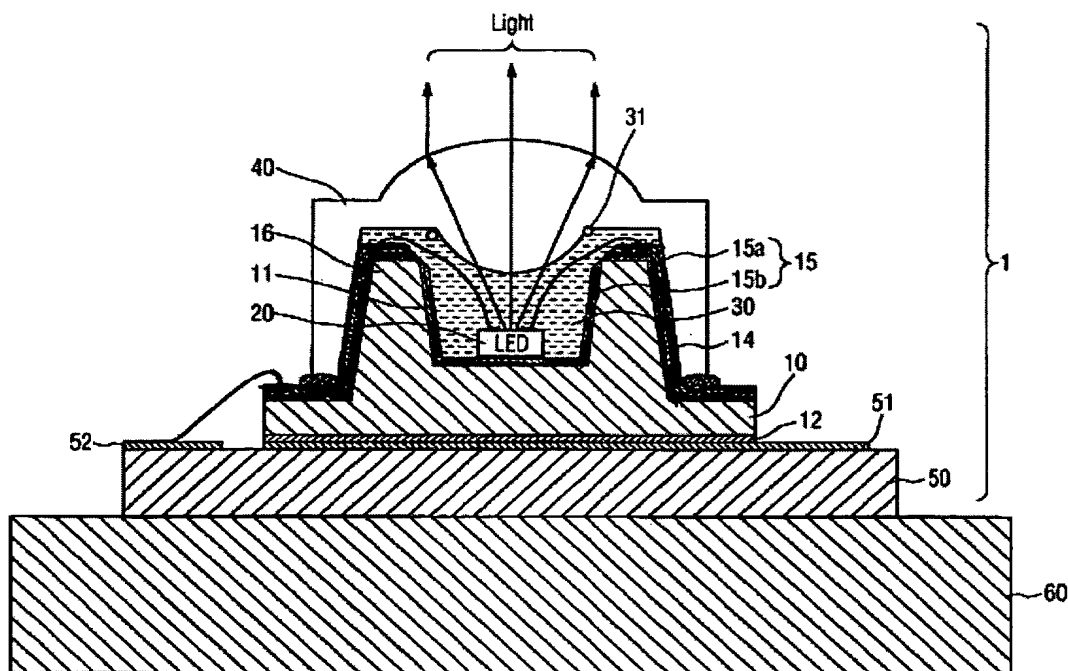


FIG. 1

Shie et al. includes an aluminum oxide layer **14** and a layer of electrode material **15**. For ease of the Board's review, the aluminum oxide layer **14** is colored blue and the layer of electrode material **15** is colored red in Figure 1 of Shie et al.

As is clear from Figure 1 of Shie et al. and the description of Shie et al. that describes this figure, the above-underlined structural recitations of Claims 3 and 15 of the present application are simply not described in Shie et al. and, in fact, Shie et al. teaches away from these structural recitations. In particular, Shie et al. Column 3, lines 4-25 states:

Further, a layer of aluminum oxide (alumina) **14** functioned as an insulating layer is firstly formed on the upper surface and the outer surface of the wall **16**, except on the inner surfaces of the cup-shaped portion **11**, and then a layer of electrode material **15**, preferably a light reflective metal such as silver, gold or aluminum, is deposited to cover the layer of alumina **14** and, in addition, to cover the inner surfaces of the cup-shaped portion **11**.

In specific, the layer of electrode material **15** is formed on the layer of alumina **14** and on all of the inner surfaces of the cup-shaped portion **11**. In this state, by means of an adequate processing, a portion of electrode material **15** covered on upper inner peripheral portion of the cup-shaped portion **11** and a portion of alumina **14** covered on the

same are removed so as to separate the electrode material **15** into two parts, wherein the one part, referred to as an electrode **15b**, on all of the inner surfaces of the cup-shaped portion **11** is substantially connected to the metallic substrate **10**, and the other part, referred to as an electrode **15a**, on the alumina **14** functioned as the insulating layer between the electrode **15a** and the metallic substrate **10** can be used as an independent external electrode of the metallic substrate **10**.
(Emphasis added.)

This passage makes it clear that, in Shie et al., the aluminum oxide coating is not formed in the cavity, whereas Claims 3 and 15 clearly recite that the aluminum oxide coating is formed in the cavity. This passage also makes it clear that the first electrode **15b** is formed in the cavity directly on the metallic substrate, whereas Claims 3 and 15 clearly recite that the first conductive trace is formed in the cavity on the conformal insulating coating. Finally, this passage also makes it clear that the second electrode **15a** is formed on the aluminum oxide coating **14** outside the cavity, whereas Claims 3 and 15 clearly recite that the second conductive trace is also formed on the conformal insulating coating in the cavity. Accordingly, this passage of Shie et al., along with Figures 1-3 of Shie et al., teach away from many of the recitations of independent Claims 3 and 15.

In an attempt to supply the missing teaching, the Final Office Action cited Yang et al. Figure 7 of Yang et al. is reproduced below:

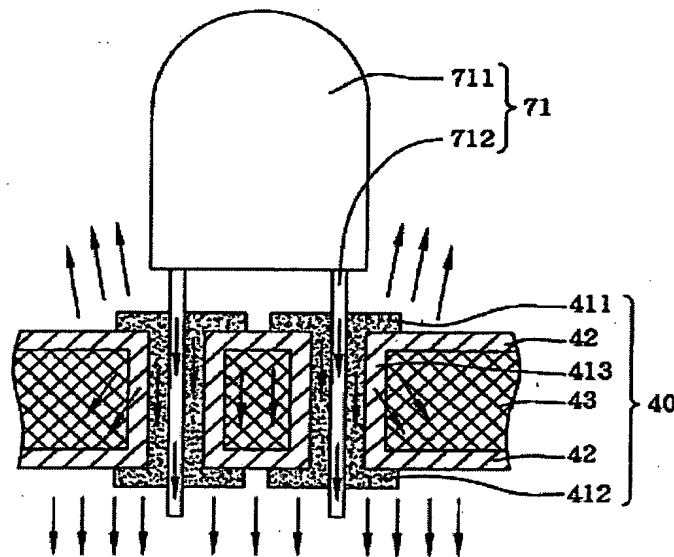


Fig. 7

Assume, for the sake of argument that Yang et al. discloses a mounting substrate 43 that can be aluminum, and an insulating aluminum oxide layer 42, as stated at Page 3 of the Final Office Action. However, in Yang et al., the LED 71 stands away from the metal plate 43. Metal plate 43 is flat, and there is no cavity in the metal plate 43 in which a semiconductor light emitting device is mounted. Rather, as noted in Paragraph [0023] of Yang et al., the insulating layer 42 provides an insulating layer in the through holes of the metal plate:

Inside the substrate 40 a metal plate 43 comprising a plurality of holes, whereas there forms the protective insulating layer 42 on the holes of the metal plate 43 and on the upper and lower surface of the metal plate 43.

Accordingly, the combination of Shie et al. with Yang et al. would not disclose the above-underlined recitations of Claims 3 and 15, because Yang et al. does not disclose a cavity, a conformal insulating coating in the cavity or conductive traces on the coating in the cavity. Moreover, it would not be obvious to combine Yang et al. with Shie et al. to provide a conformal insulating coating in the cavity and conductive traces on the coating in the cavity in direct contradiction to the explicit teachings of Shie et al. Finally, even if these references were somehow combined, the combination might provide an insulating layer in the through holes of a metal plate, but would not describe or suggest a conformal insulating coating in the cavity and conductive traces on the coating in the cavity.

The Final Office Action has combined Shie et al. and Yang et al. despite the clear teachings away in Shie et al. Contrary to the requirements for establishing a *prima facie* case of obviousness, the references have been combined despite the teaching away in the primary reference as to the desirability of the combination. Moreover, even if combined, the claim recitations simply would not be described or suggested, as was shown above. The combination of elements recited in Claims 1 and 15 are only taught by the present application. For at least these reasons, a *prima facie* case of obviousness has not been made as to independent Claims 3 and 15.

In the "Response to Arguments" section of the Final Office Action (Page 8), the Final Office Action cited case law stating that the test for obviousness is what the combined teachings of the references would have suggested to those having skill in the art, and the impermissibility of attacking references individually where the rejections are based on combinations of references. However, Appellants have shown above that the primary reference explicitly teaches away from the claimed invention and that, even if the claimed

references were combined, the claim recitations were not met. The "Response to Arguments" section actually concludes, at the bottom of Page 8:

Thus, prior arts must be considered in its entirety, including disclosures that teach away from the claims, MPEP §2143.01-02.

Yet, Appellants respectfully submit that the final Office Action ignores the prior art in its entirety, including disclosures that teach away from the claims.

C. Dependent Claims 4-7, 9-14 and 16-20 Are Independently Patentable

Dependent Claims 4-7, 9-14 and 16-20 are patentable at least by virtue of the patentability of the independent claims from which they depend. Moreover, many of these dependent claims are separately patentable. Three classes of dependent claims will now be analyzed.

i. Claims 4 and 16 Are Independently Patentable

Dependent Claim 4 recites that the first and second spaced apart conductive traces extend around at least one side of the aluminum block and onto a second face of the aluminum block. These claims are independently patentable because in Shie et al. Figure 1, the conductive traces 15 are clearly not shown as extending around at least one side of the aluminum block from a first face to the second face thereof. Rather, a wire bond is shown as connecting the conductive trace 15 to a pad 52. Nor does Yang et al. supply the missing teachings. Similar analysis applies to Claim 16.

ii. Dependent Claims 5 and 17 Are Independently Patentable

Dependent Claims 5 and 17 recite that the conductive traces comprise reflective material. Since neither of the references describes conductive traces on the conformal insulating coating in the cavity, none of these references describe the recitations of Claim 5 or 17, wherein the conductive traces comprise reflective material. Accordingly, these claims are independently patentable.

iii. Dependent Claims 7 and 19 Are Independently Patentable

Dependent Claims 7 and 19 are independently patentable. These claims clearly recite that the through holes extend from the cavity to the second face. Neither of

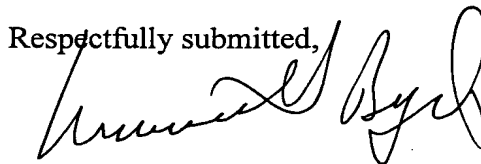
these references describe through holes that extend from the cavity to the second face.
Accordingly, these claims are separately patentable.

Conclusions

In summary, Appellants respectfully submit that the cited references do not establish a *prima facie* case of obviousness because all of the recitations of the independent claims would not be described even if the references are combined, and the rejection ignores the clear teaching away by the primary reference. Moreover, many of the dependent claims are also independently patentable. Accordingly, Appellants respectfully request reversal of the rejections of the claims, allowance of the claims and passing of the application to issue.

It is not believed that an extension of time and/or additional fee(s) are required, beyond those that may otherwise be provided for in documents accompanying this paper. In the event, however, that an extension of time is necessary to allow consideration of this paper, such an extension is hereby petitioned for under 37 C.F.R. §1.136(a). Any additional fees believed to be due in connection with this paper may be charged to Deposit Account No. 50-0220.

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APPENDIX A – CLAIMS APPENDIX

1-2. (Canceled)

3. (Previously Presented) A mounting substrate for a semiconductor light emitting device comprising:

a solid aluminum block including a cavity in a face thereof that is configured for mounting a semiconductor light emitting device therein;

a conformal insulating coating comprising aluminum oxide on a surface of the solid aluminum block, and in the cavity; and

first and second spaced apart conductive traces on the conformal insulating coating in the cavity that are configured for connection to a semiconductor light emitting device.

4. (Previously Presented) A mounting substrate according to Claim 3 wherein face is a first face and wherein the first and second spaced apart conductive traces extend from the cavity to the first face, around at least one side of the aluminum block and onto a second face of the aluminum block that is opposite the first face.

5. (Previously Presented) A mounting substrate according to Claim 3 wherein the first and second spaced apart conductive traces on the conformal insulating coating in the cavity comprise reflective material.

6. (Previously Presented) A mounting substrate according to Claim 3 wherein the face is a first face and wherein the solid aluminum block includes therein first and second through holes that extend from the first face to a second face of the solid aluminum block that is opposite the first face, the respective first and second through holes including a respective first and second conductive via therein that extends from the first face to the second face and wherein a respective one of the spaced apart conductive traces is electrically connected to a respective one of the conductive vias.

7. (Original) A mounting substrate according to Claim 6 wherein the first and second through holes extend from the cavity to the second face.

8. (Canceled)
9. (Previously Presented) A mounting substrate according to Claim 3 wherein the face is a first face and wherein the solid aluminum block includes therein first and second through holes that extend from the first face to a second face of the solid aluminum block that is opposite the first face, the respective first and second through holes including the conformal insulating coating thereon that comprises aluminum oxide and a respective first and second conductive via therein that extends from the first face to the second face and wherein a respective one of the spaced apart conductive traces is electrically connected to a respective one of the conductive vias.
10. (Previously Presented) A mounting substrate according to Claim 6 further comprising third and fourth spaced apart conductive traces on the second face of the solid aluminum block, a respective one of which is connected to a respective one of the conductive vias.
11. (Original) A mounting substrate according to Claim 3 in combination with a semiconductor light emitting device that is mounted in the cavity and is connected to the first and second spaced apart conductive traces.
12. (Original) A mounting substrate according to Claim 11 in further combination with a lens that extends across the cavity.
13. (Original) A mounting substrate according to Claim 12 in further combination with an encapsulant between the semiconductor light emitting device and the lens.
14. (Previously Presented) A mounting substrate according to Claim 12 in further combination with a lens retainer on the solid aluminum block that is configured to hold the lens across the cavity.
15. (Previously Presented) A light emitting device comprising:

a solid aluminum block including a cavity in a face thereof and a conformal aluminum oxide coating on a surface thereof including in the cavity;

first and second spaced apart conductive traces on the conformal aluminum oxide coating in the cavity;

a semiconductor light emitting device that is mounted in the cavity and is connected to the first and second spaced apart conductive traces;

a lens that extends across the cavity; and

an encapsulant between the semiconductor light emitting device and the lens.

16. (Original) A light emitting device according to Claim 15 wherein the face is a first face and wherein the first and second spaced apart conductive traces extend from the cavity to the first face, around at least one side of the solid aluminum block and onto a second face of the solid aluminum block that is opposite the first face.

17. (Previously Presented) A light emitting device according to Claim 15 wherein the first and second spaced apart conductive traces on the conformal aluminum oxide coating in the cavity comprise reflective material.

18. (Previously Presented) A light emitting device according to Claim 15 wherein the face is a first face and wherein the solid aluminum block includes first and second through holes that extend from the first face to a second face of the solid aluminum block that is opposite the first face, the respective first and second through holes including the conformal aluminum oxide coating thereon and a respective first and second conductive via therein that extends from the first face to the second face and wherein a respective one of the spaced apart conductive traces is electrically connected to a respective one of the conductive vias.

19. (Original) A light emitting device according to Claim 18 wherein the first and second through holes extend from the cavity to the second face.

20. (Original) A light emitting device according to Claim 18 further comprising third and fourth spaced apart conductive traces on the second face of the solid aluminum block, a respective one of which is connected to a respective one of the conductive vias.

21-28. (Canceled)

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APPENDIX B – EVIDENCE APPENDIX
(NONE)

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APPENDIX C – RELATED PROCEEDINGS
(NONE)